

RTP - EnergyServiceProvider Energy and Ancillary Services Aggregation

1 Descriptions of Function

All prior work (intellectual property of the company or individual) or proprietary (non-publicly available) work should be so noted.

1.1 Function Name

RTP - EnergyServiceProvider Energy and Ancillary Services Aggregation

1.2 Function ID

IECSA identification number of the function

C-4,C-6.4

1.3 Brief Description

Describe briefly the scope, objectives, and rationale of the Function.

Energy Service Provider (EnergyServiceProvider) collects energy and ancillary services bids and offers from RTP and other DER subscribing customers. The EnergyServiceProvider combines those bids into an aggregate bid into the market operations bid/offer system. When accepted, the EnergyServiceProvider notifies the end customer of the status and requests scheduling of the services.

1.4 Narrative

A complete narrative of the Function from a Domain Expert's point of view, describing what occurs when, why, how, and under what conditions. This will be a separate document, but will act as the basis for identifying the Steps in Section 2.

Energy Service Provider (EnergyServiceProvider) collects energy and ancillary services bids and offers from RTP and other DER subscribing customers. The EnergyServiceProvider combines those bids into an aggregate bid into market operations. The incoming bids are prioritized and based on price, quality and size. Bids may be based upon distributed generation or other resource such as deferrable load or switch-able capacitors for reactive power supply/voltage support. These bids are combined and offered into the

market operations bid/offer system. Market Operations evaluates the bids against the energy and ancillary services needs in the system based upon the load forecast, energy schedules and marginal costs for generation. Market operations will notify the EnergyServiceProvider of acceptance of the bids and requests that the services be scheduled. The EnergyServiceProvider then determines the best set of customer bids to meet the accepted aggregate bid. The EnergyServiceProvider then notifies the selected customers of the accepted bids and requests that the services be scheduled.

It is possible that Market Operations may issue new RTP base tables if the energy bids significantly effect marginal costs. If so an iteration of the RTP pricing process may be initiated if the tariffs allow for such.

Some customers may be subscribers to independent energy and ancillary services aggregation provides who intern offer into Market Operations bid/offer system. This use case deals specifically with EnergyServiceProvider RTP customers.

1.5 Actor (Stakeholder) Roles

Describe all the people (their job), systems, databases, organizations, and devices involved in or affected by the Function (e.g. operators, system administrators, technicians, end users, service personnel, executives, SCADA system, real-time database, RTO, RTU, IED, power system). Typically, these actors are logically grouped by organization or functional boundaries or just for collaboration purpose of this use case. We need to identify these groupings and their relevant roles and understand the constituency. The same actor could play different roles in different Functions, but only one role in one Function. If the same actor (e.g. the same person) does play multiple roles in one Function, list these different actor-roles as separate rows.

<i>Grouping (Community)</i>		<i>Group Description</i>
<i>Energy Service Provider (EnergyServiceProvider)</i>		Provides energy to end-use customers
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
EnergyService Provider Bid and Offer System	System	The system that receives energy and ancillary services bids from RTP customers holds that information and tracks the bids. Also notifies customers of acceptance or decline of bids and offers.
EnergyService	System	Combines and rates the incoming bids and aggregates them into a single or few

<i>Grouping (Community)'</i>		<i>Group Description</i>
<i>Energy Service Provider (EnergyServiceProvider)</i>		Provides energy to end-use customers
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
Provider Aggregation System		large bids for submission to the Market Operation Energy and Ancillary Services Bid/Offer system.
EnergyService Provider Bid Submittal System	System	Enters bids and offers to the Market Operation Energy and Ancillary Services Bid/Offer system.
EnergyService Provider	Community	This Community/

<i>Grouping (Community)'</i>		<i>Group Description</i>
<i>RTP Customer</i>		Energy end-use customers and their systems
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
Customer	Person or system	Submits Energy and/or Ancillary services bids to EnergyServiceProvider Bid/offer system.

<i>Grouping (Community)</i>		<i>Group Description</i>
<i>Market Operations</i>		Forecasts loads, determines optimal loads, and initiates process to determine tables of Base RTP values for the next hours and days
<i>Actor Name</i>	<i>Actor Type (person, device, system etc.)</i>	<i>Actor Description</i>
Market Ops. Bid and Offer System	System	The system that receives energy and ancillary services bids from EnergyServiceProvider, independent aggregators and large customers. Also notifies bidders of acceptance or decline of bids and offers.
MarketOperationSystem	Community	This Community

1.6 Information exchanged

Describe any information exchanged in this template.

<i>Information Object Name</i>	<i>Information Object Description</i>
Customer Bids and Offers	Bids for energy and ancillary services from RTP end-use customers to EnergyServiceProvider for aggregation.
Acceptance of Bids and Offers	Contractual acceptance to bids and offers made by RTP end-use customers
Aggregated Bids and Offers	Aggregated bids and offers for energy and ancillary services made by EnergyServiceProvider to Market Operations
Acceptance of Aggregated Bids and Offers	Contractual acceptance to bids and offers made by EnergyServiceProvider to Market Operations

1.7 Activities/Services

Describe or list the activities and services involved in this Function (in the context of this Function). An activity or service can be provided by a computer system, a set of applications, or manual procedures. These activities/services should be described at an appropriate level, with the understanding that sub-activities and services should be described if they are important for operational issues, automation needs, and implementation reasons. Other sub-activities/services could be left for later analysis.

<i>Activity/Service Name</i>	<i>Activities/Services Provided</i>

1.8 Contracts/Regulations

Identify any overall (human-initiated) contracts, regulations, policies, financial considerations, engineering constraints, pollution constraints, and other environmental quality issues that affect the design and requirements of the Function.

<i>Contract/Regulation</i>	<i>Impact of Contract/Regulation on Function</i>
Accepted Bid or Offer	Constitutes a contract to provide the bid service at the specified time

<i>Policy</i>	<i>From Actor</i>	<i>May</i>	<i>Shall Not</i>	<i>Shall</i>	<i>Description (verb)</i>	<i>To Actor</i>
Provide Service	Customer			X	Provide accepted services as bid	EnergyServiceProvider

<i>Constraint</i>	<i>Type</i>	<i>Description</i>	<i>Applies to</i>
Laws of physics	Environmental	Laws of physics for power system operations	All
Technology	Environmental	Technology constraints for providing real-time pricing information to all customers with RTP as part of their customer tariffs	All
Security	Environmental	Security policies and technologies must be established and used to address all security needs at the appropriate/contracted levels	All
Environmental		Carbon production limits may limit ability to generate	Customer

2 Step by Step Analysis of Function

Describe steps that implement the function. If there is more than one set of steps that are relevant, make a copy of the following section grouping (Preconditions and Assumptions, Steps normal sequence, and Steps alternate or exceptional sequence, Post conditions)

2.1 Steps to implement function

Name of this sequence.

2.1.1 Preconditions and Assumptions

Describe conditions that must exist prior to the initiation of the Function, such as prior state of the actors and activities

Identify any assumptions, such as what systems already exist, what contractual relations exist, and what configurations of systems are probably in place

Identify any initial states of information exchanged in the steps in the next section. For example, if a purchase order is exchanged in an activity, its precondition to the activity might be 'filled in but unapproved'.

<i>Actor/System/Information/Contract</i>	<i>Preconditions or Assumptions</i>
Customers	RTP Customers have calculated their bid and offers for Energy and Ancillary Services for the bid period.

2.1.2 Steps – Normal Sequence

Describe the normal sequence of events, focusing on steps that identify new types of information or new information exchanges or new interface issues to address. Should the sequence require detailed steps that are also used by other functions, consider creating a new “sub” function, then referring to that “subroutine” in this function. Remember that the focus should be less on the algorithms of the applications and more on the interactions and information flows between “entities”, e.g. people, systems, applications, data bases, etc. There should be a direct link between the narrative and these steps.

The numbering of the sequence steps conveys the order and concurrency and iteration of the steps occur. Using a Dewey Decimal scheme, each level of nested procedure call is separated by a dot ‘.’. Within a level, the sequence number comprises an optional letter and an integer number. The letter specifies a concurrent sequence within the next higher level; all letter sequences are concurrent with other letter sequences. The number specifies the sequencing of messages in a given letter sequence. The absence of a letter is treated as a default ‘main sequence’ in parallel with the lettered sequences.

Sequence 1:

*1.1 - Do step 1
1.2A.1 - In parallel to activity 2 B do step 1
1.2A.2 - In parallel to activity 2 B do step 2
1.2B.1 - In parallel to activity 2 A do step 1
1.2B.2 - In parallel to activity 2 A do step 2
1.3 - Do step 3
1.3.1 - nested step 3.1
1.3.2 - nested step 3.2*

Sequence 2:

*2.1 - Do step 1
2.2 - Do step 2*

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
#	<i>Triggering event? Identify the name of the event.¹</i>	<i>What other actors are primarily responsible for the Process/Activity? Actors are defined in section0.</i>	<i>Label that would appear in a process diagram. Use action verbs when naming activity.</i>	<i>Describe the actions that take place in active and present tense. The step should be a descriptive noun/verb phrase that portrays an outline summary of the step. "If ...Then...Else" scenarios can be captured as multiple Actions or as separate steps.</i>	<i>What other actors are primarily responsible for Producing the information? Actors are defined in section0.</i>	<i>What other actors are primarily responsible for Receiving the information? Actors are defined in section0. (Note – May leave blank if same as Primary Actor)</i>	<i>Name of the information object. Information objects are defined in section 1.6</i>	<i>Elaborate architectural issues using attached spreadsheet. Use this column to elaborate details that aren't captured in the spreadsheet.</i>	<i>Reference the applicable IECSA Environment containing this data exchange. Only one environment per step.</i>
1.1	Customer completes bid / offer optimizations	Customer		Customer makes calculations indicating advantages to bidding energy or ancillary services to EnergyServiceProvider/aggregator. Customer transmits bids to EnergyServiceProvider.	Customer	EnergyService Provider Bid and Offer System	Customer Bids and Offers		Customer / ESP
1.2	EnergyService Provider Receives bids	EnergyService Provider Bid and Offer System		EnergyServiceProvider aggregates bid from multiple customers.	EnergyService Provider Bid and Offer System	EnergyService Provider Aggregation System	Customer Bids and Offers		RTOs / Market ParticipantsRTOs / Market Participants

¹ Note – A triggering event is not necessary if the completion of the prior step – leads to the transition of the following step.

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments
1.3	EnergyServiceProvider Aggregates bids and offers	EnergyServiceProvider Aggregation System		EnergyServiceProvider submits bids and offers to Market operations energy and ancillary services bid and offer system for evaluation and acceptance	EnergyServiceProvider Aggregation System	Market Ops. Bid and Offer System	Aggregated Bids and Offers		RTOs / Market Participants RTOs / Market Participants
1.4	Market Operations evaluates bid/ offers	Market Ops. Bid and Offer System		Market Operations evaluates bids and offers from multiple sources and accepts some and rejects others. Notification of bid or offer status is sent to bidders	Market Ops. Bid and Offer System	EnergyServiceProvider Aggregation System	Acceptance of Aggregated Bids and Offers		RTOs / Market Participants RTOs / Market Participants
1.5	Market Ops accepts bids and offers	EnergyServiceProvider Aggregation System		EnergyServiceProvider evaluates the overall bid acceptance, and allocates various customer bids to fulfill commitments.	EnergyServiceProvider Aggregation System	EnergyServiceProvider Bid and Offer System	Acceptance of Bids and Offers		RTOs / Market Participants RTOs / Market Participants
1.6	EnergyServiceProvider bid acceptance	EnergyServiceProvider Bid and Offer System		Customers are notified by EnergyServiceProvider of bid status.	EnergyServiceProvider Bid and Offer System	Customer	Acceptance of Bids and Offers		Customer / ESP

2.1.3 Steps – Alternative / Exception Sequences

Describe any alternative or exception sequences that may be required that deviate from the normal course of activities. Note instructions are found in previous table.

#	Event	Primary Actor	Name of Process/Activity	Description of Process/Activity	Information Producer	Information Receiver	Name of Info Exchanged	Additional Notes	IECSA Environments

2.1.4 Post-conditions and Significant Results

Describe conditions that must exist at the conclusion of the Function. Identify significant items similar to that in the preconditions section.

Describe any significant results from the Function

<i>Actor/Activity</i>	<i>Post-conditions Description and Results</i>
EnergyServiceProvider	Committed to providing accepted aggregated energy and ancillary services bids.
Customer	Committed to providing accepted energy and ancillary services bids.

2.2 Architectural Issues in Interactions

Elaborate on all architectural issues in each of the steps outlined in each of the sequences above. Reference the Step by number.



Microsoft Excel
Worksheet

2.3 Diagram

For clarification, draw (by hand, by Power Point, by UML diagram) the interactions, identifying the Steps where possible.

3 Auxiliary Issues

3.1 References and contacts

Documents and individuals or organizations used as background to the function described; other functions referenced by this function, or acting as “sub” functions; or other documentation that clarifies the requirements or activities described. All prior work (intellectual property of the company or individual) or proprietary (non-publicly available) work must be so noted.

ID	Title or contact	Reference or contact information
[1]		
[2]		

3.2 Action Item List

As the function is developed, identify issues that still need clarification, resolution, or other notice taken of them. This can act as an Action Item list.

ID	Description	Status
[1]		
[2]		

3.3 Revision History

For reference and tracking purposes, indicate who worked on describing this function, and what aspect they undertook.

No	Date	Author	Description
0.9	3/1/04	Jack King	First cut completed.

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